the FLIR boresight is displayed along the left side of the CRT.

With the exception of FLIRs set at fixed boresights, the operator must have some means to control the center of the FLIR IFOV. In the sample system, a joystick hand controller is used. The controller is used in three situations. In the fuselage referenced mode, the hand controller is used to adjust the boresight angle from the fuselage. In the geographically stabilized mode, the hand controller is used to center the FLIR over a geographic point that remains stabilized with reference to the earth angles excluding errors caused by the tapeline height above the target. After placing the FLIR crosshairs over the target of interest, the inertial feedback system maintains alignment on the target.

4.1.3. Electro-Optical System Human Factors

As in the radar human factors section, no attempt will be made to completely cover the topic of ergonomics[14]. As with radar systems testing, electro-optical systems testing must be performed while seated at the DEP and wearing a full set of personal flight equipment. The procedure for finding the DEP was explained in the radar theory section. The anthropometric measurements and flight gear worn by the evaluator must be recorded.

4.2. ELECTRO-OPTICAL SYSTEMS TEST TECHNIQUES

4.2.1. Preflight and Built in Tests

4.2.1.1. Purpose

The purpose of this test is to assess the suitability of the FLIR preflight and turn on procedure and the BIT to quickly and easily bring the FLIR on line and insure an operating system once airborne.

4.2.1.2. General

As airplanes become more expensive, fewer and fewer will be available to accomplish each mission, amplifying the loss of individual airplanes to inflight failures. Quick, accurate ground preflight tests are essential to determine system status while repairs can still be made. A quick response/ alert time is also important and so these checks must be expeditious and must allow the operator to prepare for the mission with a minimum of distractions. Limited airplane availability also implies the need for quick turn arounds to send the same aircraft out for successive missions. This necessitates a very short preflight and turn on procedure that can be accomplished safely and thoroughly before a hurried combat mission. In the case of a FLIR, the time required for the cool down phase of the IR detectors is often the most time consuming portion of the turn on sequence; although, some very new systems use open loop coolers with much quicker cool-down times.

4.2.1.3. Instrumentation

A stop watch and data cards are required for this test. A voice tape recorder is optional.

4.2.1.4. Data Required

Record qualitative comments, time to complete the preflight/turn on and time to complete the BIT. A record of BIT indications is required. If a separate discrete is available announcing the completion of the cool down sequence, record the time to obtain this advisory.

4.2.1.5. Procedure

Perform a normal system turn on before each test flight using the published system check list. Note the times of FLIR cool down and time out and the total system preflight time up to the ready for operate indications. Perform a preflight BIT, noting the total BIT time and indications. Note any correlation between the BIT indications and the FLIR's operation. Perform a complete system check out of the failure indications while on the ground. Make qualitative comments as appropriate.

4.2.1.6. Data Analysis and Presentation

The time and complexity of the preflight procedures listed in the operator's

[14] Wolfe and Zissis provide a discussion of IR display issues [Ref. 31: Chap. 18]

checklist and FLIR turn-on/cool-down/timeout procedure should be related to the expected alert launch time requirements and the overall operator workload during the alert launch. The BIT times and the amount of operator interface required to perform the BIT should be assessed in the same scenario. Clarity of the BIT indications should be related to the cockpit environment. The BIT indications should be related to actual FLIR degradation and verified by ground technicians. Erroneous BIT false alarms should be noted and related to the probability of unnecessarily missed sorties. Some turn on procedures are strictly serial, requiring that turn on, cool down and BIT be performed in a specific order without overlap. The turn on, cool down and BIT may be individually quick and easy, but together, may delay alert launches. In this case, relate the total of all the times to the requirement to make alert launches in a timely manner.

4.2.1.7. Data Cards

Sample data cards are presented as cards 55 and 56.

CARD NUMBER ___

PREFLIGHT/TURN ON

CLARITY OF CHECKLIST INSTRUCTIONS:

LOGICAL SEQUENCE OF CHECKLIST:

THOROUGHNESS OF CHECKLIST:

SYSTEM STATUS/COOLDOWN/TIMEOUT COMPLETE INDICATIONS:

FLIR TIMEOUT TIME_____
FLIR COOL DOWN TIME _____

TOTAL PREFLIGHT TIME INCLUDING COOL DOWN/TIMEOUT_____

Card 55: Preflight/Turn On Data Card

CARD NUMBER ___

BUILT IN TESTS

INITIATION PROCEDURES:

RUN/FINISH INDICATIONS:

BIT FAILURES AND QUALITATIVE FUNCTIONAL ASSESSMENT OF THE FLIR/RESULTS OF GROUND MAINTENANCE CHECKS:

Card 56: Built In Tests Data Card